Walkability of Boston Public High Schools

Introduction

The Boston Public Schools district serves over 17,000 high school students among over 30 high schools ("At a Glance"). Students can apply to as many high schools as they want across the city; the district then assigns students to schools. In this application and assignment process, 2 miles is an extremely important distance. BPS uses MBTA rail and bus transit as well as yellow buses to transport students to their schools. Students living 2 or more miles away from their school are provided free transportation. Those within 2 miles of a school are given priority in the application process, but are not guaranteed free transportation ("Discover Boston Public Schools 2016"). 2 miles is a significant distance for a high schooler to walk, particularly in a city as crowded and trafficky (and, in the winter, as prone to snowstorms) as Boston.

The use of walk zones thus has important implications from an equity standpoint: Is 2 miles a fair guideline on which to base school preference and availability of free transportation? With this question in mind, this analysis examines the proximity of schools to MBTA stations throughout the city, incorporating median income data by census tract to present a picture of the real accessibility of Boston's public high schools.

Methods

Geocoding the Schools

The locations of all Boston Public Schools (from 2012-13) were obtained from the City of Boston’s website. The universe of this analysis is high school students, as the transportation conditions apply to them. In Boston, a total of 37 schools serve grades including, but not limited to, 9-12. School addresses and latitude-longitude coordinates were checked on the BPS Directory and, when unclear, on Google Maps. The schools were geocoded into ArcMap using the Add XY function and their locations were re-checked; then, the schools were projected to State Plane NAD 83 Massachusetts Mainland 2001 (meters).

Adding T Stops and Conducting a Network Analysis

MBTA line and station shapefiles (MassGIS) and a Boston streetlines shapefile (Tufts S. Drive) were added to the map. A Network was created using schools as facilities with a XY function and their locations were re-counted for the 8 schools furthest from the T (i.e., those that have the closest T stop between 1 and 2 miles away). There was an unexpected increase in average census median income from the schools with the nearest T within 0.25 to 0.5 miles to those with the nearest T within 0.5 to 1 miles. It was expected that there would be a stronger positive correlation between proximity to T and median income: i.e., that the schools (and census tracts) closest to T would all have the highest median income, and those furthest would have the lowest median income. This may not have occurred in part due to the lack of double-counting of schools.

Incorporating Census Data

Median income data were added by census tract using 2010 ACS 5-year estimates; these data were downloaded from Census.gov and added using 2016 TIGER streetline data to a map containing the walkability network discussed above. Census data are depicted in “School Locations and Census Data.” Census data were spatially joined with schools to create the “Schools, T Proximity, and Median Income” map.

Discussion

With regard to the general proximity and walkability figures, it is important to note the substantial differences in number of schools in the four distance categories. Using BPS’ 2 mile measure of eligibility, all schools are within walking distance of a T station. Using stricter numbers substantially decreases the number of schools within walking distance: only 3 are within 0.25 miles (a typical walkability metric). The Locations and Census Data map shows an interesting trend: there appear to be no schools in the census tracts with the very highest median income in Boston (based on the five-part natural breaks division). As seen in the Schools, T Proximity, and Median Income table below, census median income is the highest for the 8 schools furthest from the T (i.e., those that have the closest T stop between 1 and 2 miles away). There was an unexpected increase in average census median income from the schools with the nearest T within 0.25 to 0.5 miles to those with the nearest T within 0.5 to 1 miles. It was expected that there would be a stronger positive correlation between proximity to T and median income: i.e., that the schools (and census tracts) closest to T would all have the highest median income, and those furthest would have the lowest median income. This may not have occurred in part due to the lack of double-counting of schools.

Conclusion

It seems that 2 miles may be too large a distance to use as a guideline for admission preferences and free transportation availability. Though students’ home locations vs. school locations are not analyzed here, the fact that 35 out of 37 high schools are within 2 walking miles of a T station while only 27 are within 1 mile indicates a significant gap. Boston Public Schools has budgeted over $84 million in transportation funding for School Year 2016-17 (“At a Glance”). Creating a smaller walk zone for students and/or increasing the percent-age of seats reserved for walk zone students might increase the number of students located close enough to their schools to need less transportation, lessening BPS costs and importantly lightening the commute these students..

This analysis does not consider the social and educational benefits of interacting with students across the city. Further research might take this into account. Such research might also examine all BPS high school students’ home and school locations and typical commute times. This could give a more complete picture of students’ commute experiences, which would be valuable in determining the most appropriate walk zone.

Projection: Massachusetts State Plane NAD 83 (2001) (meters) (Lambert Conformal Conic) Data sources: MBTA data from MassGIS, Boston streetlines data from Tufts S. Drive (S:\Classes\UEP_254_Fall2016\Lab6\Boston_Network.gdb\Boston_bostonstreetdata_Project), BPS data from City of Boston. Works Cited:
